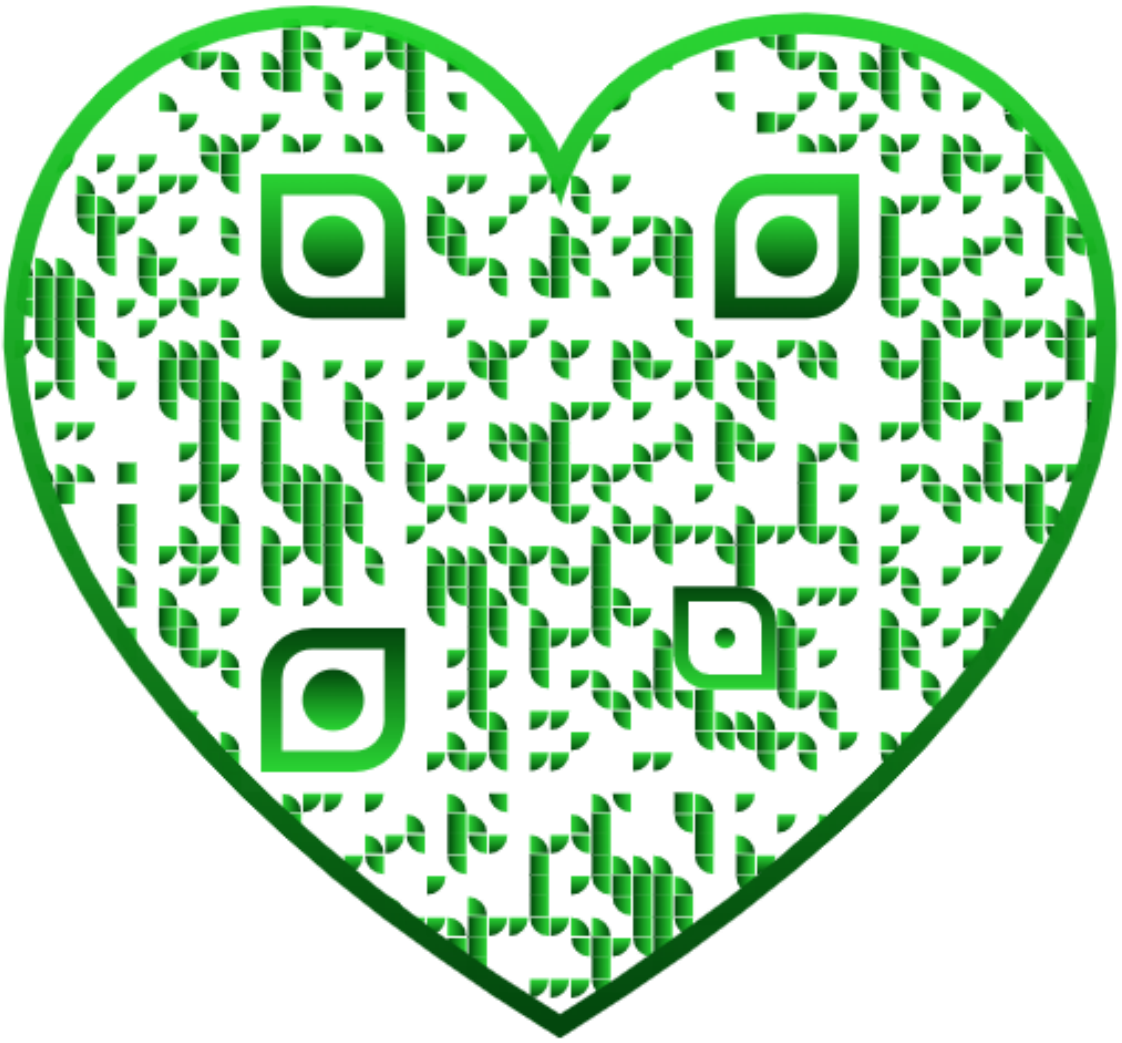
3: Essentials of Healthcare Supply Chain Management



Chapter objectives

- Define Pharmaceutical supply chain and supply chain management
- Define logistics and key Logistics terminologies
- Understand the need of supply chain management
- Describe the supply chain drivers
- Describe how to develop pharmaceutical Supply Chain Maps
- Explain the impact of globalization on pharmaceuticals supply chains
- Discuss the importance and integrity of the supply chain to global health

Supply Chain and Supply Chain Management

- **Supply Chain (SC):**
  - It is also refereed to as the '***logistics network***'
  - Refers to products, services, finances, and information flowing from a supplying organization to end users
  - It is a network of organizations, their facilities, functions, and activities that are involved, through upstream and downstream linkages in the different processes and activities, in producing and delivering a product or service in the hand of the ultimate consumer
    - The sequence begins with suppliers of raw materials and extends all the way to the final customer

Supply Chain and Supply Chain Management…

- SC can also be described as a system of organizations, people, activities, information, and resources involved in moving a product or service from supplier to end-users.
- Three flow forms in SC :
  - **Material flow:** also known as logistics chain
  - **Information flow**: also known as information chain
  - **Finance flow:** also know as Value Chain

Supply Chain and Supply Chain Management

- **Supply Chain Management (SCM)**
  - A set of approaches utilized to efficiently integrate organization units: suppliers, manufacturers, warehouses and stores along a SC, and coordinate flows; material, information and financial flows
    - So that the product is produced and distributed
      - In the right quantities
      - To the right locations and at the right time
      - In order to optimize system-wide performance satisfy customer service level requirements

Supply Chain Management…

- SCM describes the successful management of supply chain operations to gain competitive advantages and customer satisfaction
  - It reflects a concerted attempt by supply chain organizations to build and manage supply chains in the most reliable and possible profitable ways
- **Pharmaceuticals supply chain management**
  - It is the management of health products and information flow in a supply chain system at a value-for-money cost to provide adequate, appropriate supplies to patients

Key Supply Chain Terminology and Concepts

- **Value:**
  - The ultimate goal of supply chain management is to serve the customer better by creating or adding value
  - SCM begins with the understanding of customer values and requirements
  - ***"value"*** is the amount customers are willing to pay for what an organization provides them and thus is measured by total revenue, a reflection of the price an organization's product and service commands and the units it can sell
    - The extent of value created and added by the organization dictates its level of success, because the higher the value, the greater the customer satisfaction and competitive advantage

Key Supply Chain Terminology and Concepts…

- **Value Chain:**
  - Begins with new product development, which creates specifications for the product
  - Marketing and sales generate demand by publicizing the customer priorities that the products and services will satisfy
  - Marketing also brings customer input back to new product development
  - Using a new product specifications, operations transforms inputs to outputs to create the product

Key Supply Chain Terminology and Concepts…

- **Value chain…**
  - Distribution either takes the product to the customer or brings the customer to the product.
  - Service responds to customer requests during or after the sale.
    - These are core processes or functions that must be performed for a successful sale.
  - Finance, accounting, information technology, and human resources support and facilitate the functioning of the value chain.

Key Supply Chain Terminology and Concepts…

- **Push Versus pull strategy:**
  - Placing orders is a routine activity in logistics
  - In most logistics systems, an order is placed for new supplies every month or every quarter
  - In some logistics systems, the quantity to be ordered is determined by the person placing the order.
    - This is called a ***pull or requisition system***
  - In other systems, the quantity to be ordered is determined by the person who fulfills the order
    - This is called a ***push or allocation system*****.**

Key Supply Chain Terminology and Concepts…

Table: Characteristics of Pull, Push and Pull/Push strategies

	PUSH	PULL
Objective	Minimize Cost	Maximize Service Level
Complexity	High	Low
Focus	Resource Allocation	Responsiveness
Lead Time	Long	Short
Processes	Supply Chain Planning	Order Fulfillment

Key Supply Chain Terminology and Concepts…

- **Postponement strategy:**
  - **Postponement**:
    - It is a supply chain strategy for rapid response to changing market conditions.
    - It is first implemented in manufacturing processes to reduce cost of inventory and improve service level within the company while the product variety increases.
    - The concept of postponement is to delay the change in form, identity and place to the latest possible point until customer commitments have been obtained.
    - It is by exploiting the commonality between items and by designing the production and distribution process so as to delay the point of differentiation

Key Supply Chain Terminology and Concepts…

- Postponement is closely intertwined with modularization where products in a certain product family are designed where all of them consist of different standardized units
- With modularization, combination of different standardized sub-components allows the producing of different end products.
- The form, function and place of the product are altered and is in contra with the push systems in which goods are manufactured entirely in anticipation of future customer orders and stored downstream without customer's formulated specifications

Key Supply Chain Terminology and Concepts…

- **Bullwhip effect:**
  - A supply chain phenomenon describing how small fluctuations in demand at the retail level can cause progressively larger fluctuations in demand at the wholesale, distributor, manufacturer, and raw material supplier levels.
  - The effect is named after the physics involved in cracking a whip.

Key Supply Chain Terminology and Concepts…

Factors Contributing to the Bullwhip

- Demand forecasting practices
  - Min-max inventory management (reorder points to bring inventory up to predicted levels)
- Lead time
  - Longer lead times lead to greater variability in estimates of average demand, thus increasing variability and safety stock costs
- Batch ordering
  - Peaks and valleys in orders
  - Fixed ordering costs
  - Impact of transportation costs (e.g., fuel costs)
  - Sales quotas
- Price fluctuations
  - Promotion and discount policies
- Lack of centralized information

Supply Chain Terminology and Concepts…

Taming the Bullwhip

Four critical methods for reducing the Bullwhip effect:

- Reduce uncertainty in the supply chain
  - Centralize demand information
  - Keep each stage of the supply chain provided with up-to-date customer demand information
  - More frequent planning (continuous real-time planning the goal)
- Reduce variability in the supply chain
  - Every-day-low-price strategies for stable demand patterns
- Reduce lead times
  - Use cross-docking to reduce order lead times
  - Use EDI techniques to reduce information lead times
- Eliminate the bullwhip through strategic partnerships
  - Vendor-managed inventory (VMI)
  - Collaborative planning, forecasting and replenishment (CPFR)

Supply Chain Terminology and Concepts…

- **Strategic alliance:**
  - It is an arrangement between two companies to undertake a mutually beneficial project while each retains its independence
  - The agreement is less complex and less binding than a joint venture, in which two businesses pool resources to create a separate business entity

Supply Chain Terminology and Concepts…

- **Core Competency:**
  - Also known as '***distinctive competencies***'
  - It refer to its ***resources and unique fundamental capabilities that distinguish it from market competitors*** and give it competitive advantage.
  - It is an essential component of marketing strategy leading to brand recognition and business growth
  - Useful for organization working on healthcare (pharmaceutical supply chain business)

Logistics Management

- **Logistics**
  - It is part of SCM that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirement
  - It is basically a process of transporting goods (either raw material or finished products) from one point to another point.

Logistics Management…

- Two major functions of logistics:
  - *Transportation* and *warehousing*
  - Logistics is an integrating function, which coordinates and optimizes all logistics activities, as well as integrates logistics activities with other functions including marketing, sales manufacturing, finance, and information technology

Logistics Management…

- **Inbound and Outbound Logistics**
  - **Inbound logistics:**
    - It refers to the sourcing, expediting and receiving of goods that is coming to the business organization
  - **Outbound logistics:**
    - It is all about warehousing, packaging and transporting of goods, going out of the organization

Logistics Management…

Table : Comparison of Inbound Logistics and Outbound Logistics

Basis for comparison	Inbound logistics	Outbound logistics
Meaning	The influx of raw material and parts, from suppliers to the manufacturing plant	The outward movement of final goods, from the company to the end user
Related to	Material management and procurement	Customer service and channel of distribution
Focuses	Deployment of resources and raw materials, within the manufacturing plant	Movement of finished goods or product from the business to the final customer
Interaction	Between the supplier and the firm	Between the firm and customers

Developing Healthcare Supply Chain Maps

- **Pharmaceutical supply chain mapping?**
  - Mapping your supply chain means gathering information about your suppliers, their own suppliers, and the people who work in your supply chain, to create a global map of your supply network.
  - To make analysis easier and more convenient, this information can be stored in a single platform
  - The supply chain mapping process isn't a one-time exercise;
    - It's an ongoing process as your supplier and supply chain change

Importance of pharmaceutical supply chain mapping

- The process of healthcare (pharmaceutical) supply chain mapping brings numerous benefits to a business
- **Some of the benefits include;**
  - It allows you to put strategies in place to rapidly react when there are supply chain problems
  - Comply with legislation
  - Create supply chain transparency and visibility.
  - Develop a deeper understanding of the surrounding costs, timeframes, and risks, and thereby gain an advantage over competitors who lack this important knowledge

Developing pharmaceutical supply chain map

- Four key steps in the supply chain mapping process.
  - 1. Learn where suppliers and their suppliers are located by working with procurement and using existing supplier lists
  - 2. Integrate information on your suppliers from different sources using a spreadsheet or data platform
    - Supply chains can change rapidly; a system for managing supplier data will help you to keep information current and in one place

Developing pharmaceutical supply chain map…

- 3. Conduct an initial risk assessment to help you prioritize where to focus next.
- 4. Use several tools to research your suppliers
  - Collect information about what is happening at supplier worksites, and research the inherent risks associated with the countries and sectors they operate within

Globalization and supply chains

- **Globalization :**
  - Refers to the *free movement of goods, services, and people across the world*.
- In SCM, globalization refers to the process in which a business operates on an international scale
- Globalization trade offers companies the opportunity to reach new customers in new markets, which dramatically upsets how manufacturers need to operate to be successful.
- Exposure to new markets means exposure to greater competition and greater risk; but also greater reward

Pros and Cons of Global Supply Chain

- **Benefits of a Globalized Supply Chain**
  - **Reach new customers in new markets around the world**
    - Globalization simplifies communication between business owners, vendors, and customers and;
      - Makes it easier to reach new markets and stay connected with customers no matter where they are in the globe
  - **Expand sourcing opportunities:**
    - Globalization makes it possible for businesses to increase production by securing a diverse selection of workers, raw material, and products from regions of the world that were previously out of reach
      - This can result in significant labor costs

Pros and Cons of Global Supply Chain…

- **Benefits of a Globalized Supply Chain…**
  - **Offer a larger selection of goods and services:**
    - Global sourcing opportunities mean an increase in the range of products and services that you can provide for your customer.
  - **Grow and expand the scope of their business:**
    - Globalization makes communication near effortless, which make it easier for markets to expand and diversify, thus providing more opportunities for businesses owners to capitalize
  - **Save money and increase profits:**
    - More options to source from and to capitalize on means more chances to save on spending and a greater chance of profit.

Pros and Cons of Global Supply Chain…

- **Negatives of a Globalized Supply Chain**
  - **Greater complexity:**
    - Global supply chains have global problems
    - As companies globalize they must scale up all aspects of their business, especially their supply chain.
  - **Increased supply chain risk**
    - Natural disasters, port and border closures and changes to the geo-political landscape, or more recently, an event like the COVID-19 pandemic.

Pros and Cons of Global Supply Chain…

- **Increased competition**
- **Greater data collection challenges**
- **More legal issues:**
  - Operating across borders means operating in countries with different legal systems, which can get complicated and expensive very quickly.

4: Selection of Pharmaceuticals

Chapter Objectives

- At the end of this chapter students will be able to:
  - Describe essential medicine concept and its principles
  - Describe pharmaceutical selection and its rationale
  - Identify criteria used in selection of pharmaceuticals
  - Explain steps in pharmaceutical selection
  - Identify sources of information used during selection of pharmaceuticals
  - Conduct pharmaceutical selection

Essential Medicine's Concept: Historical background

- **During and soon after WWII:**
  - A number of pharmaceuticals were introduced to the pharmaceutical market and the whole field of therapeutics was revolutionized
  - ***'Miracle'*** was the word used by many authors to describe the effects
    - From the global perspective, however, such miracles were for the minority (for affluent countries)

Essential Medicine's Concept….

- In many countries, there was *increasing gap in access to drugs:*
  - Two problems existed side by side:
    - ❖ No drugs at all in the countryside
    - ❖ But100s or 1000s of drugs competing for customers' attention in the cities

Essential Medicine's Concept….

- The pharmaceutical market also produced a series of disasters:
  - Inadequately tested or misused drugs resulted in many cases of serious or fatal drug-induced diseases before sufficient evidence accumulated in the public eye to mandate change
    - There was a growing recognition that pharmaceuticals often brought problems as well as great

Essential Medicine's Concept….

- Some of the complaints in the early 19th centuries were:
  - No links between drugs and health needs
  - No access to most needed drugs
  - Rising costs of pharmaceuticals
  - Uneven rural-urban distribution
  - Protests against industry marketing practice

Essential Medicine's Concept….

- **The birth of the essential drug concept**
  - WHO adopted the concept with the view that any safe and efficacious medicines should be allowed for sale, but that essential medicines should be given priority.
  - WHO defined ***essential medicines as those that satisfy the priority health care needs of the population*** in 1975.

Essential Medicine's Concept….

- In 1977, WHO published the first *model list of essential drugs*
  - The first list contains around **200 active substances**
    - Served as a guide for the development of national and institutional essential medicine lists
    - Led to a global acceptance of the concept of essential medicines as a powerful means to promote health equity
    - List is revised every 2-3 years by WHO expert committee
    - The 2011 revision contains around 350 active substances

Essential medicine concept and its principles

- A limited range of carefully selected medicines leads to
  - Better health care
  - Better management and
  - Lower costs
- It embraces the following guiding principles:
  - The vast majority of health problems for most members of the population can be treated with a small, carefully selected number of drugs
  - In practice, most doctors and other health professionals routinely use fewer than 200 drugs
    - Training and clinical experience should focus on the proper use of these few drugs

Essential medicine concept and its principles…

- Procurement, distribution and other supply activities can be carried out most economically efficiently for a limited number of pharmaceutical products
- Patients can be better informed about the effective use of drugs when the number of drugs they are confronted with is limited

Pharmaceutical selection and its rational

- **Pharmaceutical selection**
  - It is a process of deciding the type of needed pharmaceutical products for health service at any level of the health care system.
  - It is the process of identifying and picking out a number of essential pharmaceuticals in order to achieve better supply, more rational use, and lower costs
  - It emanates from the essential medicine concept

Pharmaceutical selection and its rational…

- No country or program can afford to purchase all drugs circulating in the market within its given budget
- The limited funding available shouldn't be spent on ineffective, unnecessary or even dangerous medications
- Careful selection of pharmaceuticals has considerable impact on:
  - Quality of care (clinical implications) and
  - Cost of treatment (cost implications)
    - It is therefore one of the areas where intervention is most cost-effective

Pharmaceutical selection and its rational…

Advantages of essential medicine list
More cost effective drug control, management, purchase, storage and distribution.
Improved drug use in terms of safety, simplified and more efficient drug information including training to health worker.
Identification & avoidance of adverse drug reaction and interaction.
Stimulation of local drug formulation and production.

Pharmaceutical selection and its rational…

Disadvantages of essential medicine list

- Reduced freedom of choice.
- Creation of monopolies – Favouring a single drug product.
- Reduced possibilities for gaining episodic experience e.g. new application of old drug.
- Lack of interest for drug innovation.

Pharmaceutical selection and its rational…

- Generally the rationale for selecting a limited number of essential pharmaceuticals is that it may lead to:
  - **A better supply (Supply related advantage)**
    - Easier procurement, storage and distribution
    - Adequate stocks
    - Better quality assurance
    - Easier dispensing

Pharmaceutical selection and its rational...

- **More rational prescribing and dispensing**
  - More focused training and drug information
  - More experience with fewer pharmaceuticals
  - No irrational alternatives available
  - Better recognition of drug related problems
- **Lower cost (cost related advantage)**
  - Increased competition, lower cost
- **More rational patient use**
  - Focused patient education
  - Reduced confusion and increased adherence to treatment

Criteria for Pharmaceutical selection

- Essential medicines are selected with due regard to
  - Relevance to the pattern of prevalent diseases
  - Availability of facilities
    - Diagnostic facilities,
    - Treatment facilities, physical facilities for storage and distribution and other facilities)
  - Training and experience of available personnel

Criteria for Pharmaceutical selection…

- Pharmaceutical with sound and adequate scientific data on efficacy, safety, quality, bioavailability and stability are available
- Possibilities of easy and prompt procurement and local manufacture
- Pharmaceutical products with widest possible coverage for the prevailing diseases
- Pharmaceuticals with affordable cost by considering total cost of treatment not only the unit cost of drug(s)

Steps in pharmaceutical selection

- Pharmaceutical selection involves the following basic steps whatever the level of preparation:

1. Establish pharmaceutical selection committee

- Composed of prescribers, pharmacy personnel and other concerned health personnel
- Including a pharmaceutical supply chain manager on this committee adds a needed perspective on how their selections could impact the supply chain and, eventually, product availability

Steps in pharmaceutical selection…

2. Determine the prevalent health problems and patient characteristics

- Prominent health problems in a given area can be determined by referring different data sources including morbidity registration book, surveys and other relevant materials
- The morbidity data should be complete and reliable
- The recorded data should be summarized and analyzed by age, sex, severity, frequency and ranked using percentage.

Steps in pharmaceutical selection…

3. Decide which health problems may be treated at the level of pharmaceutical selection

- The range of health problems which can be treated at a given facility can be identified by considering factors such as:
  - The level of training of health personnel involved in prescribing
  - Available diagnostic facilities such as x-ray, ultrasound etc.
  - Level of services provided i.e. curative, preventive, and other services like initial treatment, complete treatment, follow up treatment.
- Details of patient characteristics (age, sex…) and nature and severity of the health problems to be managed also should also be outlined as pharmaceuticals needed may depend on such factors

Steps in pharmaceutical selection…

4. Choose the pharmaceuticals to be used for the health problems

- Once the health problems are exhausted, selecting pharmaceuticals for each health problems is done by considering criteria outlined in the previous section

5. Structure the list

- The list of pharmaceuticals could be categorized by one or more of the following mechanisms;
  - Pharmacotherapeutic + Alphabetic
  - Level of health care
    - Primary, secondary, tertiary; or health post, health center, primary hospital, referral hospital, specialized hospital….
  - Level of importance or health impact
    - Vital-V, Essential- and Normal-use (less-essential)-N

Steps in pharmaceutical selection…

6. Introducing the list of pharmaceuticals to health professionals of the institution and other concerned bodies and finalize the list

- The draft pharmaceutical list should be presented to health professionals from different department and comments should be incorporated before a final draft is dispatched.

7. Updating the list of pharmaceuticals

- The list should be reviewed periodically
- Must be flexible to accommodate new drugs, new information on established drugs
- Any addition and deletion should be on the basis of the selection criteria

Source of information for pharmaceutical selection

- Searching for clinically relevant, up-to-date, user-specific, and unbiased drug information is essential for selection of appropriate drugs.
- The sources can be:
  - **Primary Sources:** those which produce new drug information mainly as a research articles in journals.
  - **Example:**
    - Ethiopian Pharmaceutical Journal (EPJ)
    - American Journal of Health System Pharmacy
    - British Journal of Clinical Pharmacology
    - British Medical Journal
    - Lancet, etc…

Source of information for pharmaceutical selection…

- **Secondary Sources:**
  - Are those which provide reviews of the research articles that appear in primary sources
  - Abstracting systems are also considered as secondary sources.
  - Note that primary sources may have review articles in addition to research articles.
  - **Example:**
    - Drug and therapeutic bulletin
    - Adverse drug reaction bulletin
    - Pharma forum by EPA

Chapter Summary

- Essential medicines concept entails the issue of having limited range of carefully selected medicines which leads to better health care, better management and lower costs.
- Developing national essential medicine list and pharmaceutical selection for different levels of the health care system emanates from essential medicine concept.
- Pharmaceutical selection, a process of deciding the type of needed pharmaceutical products for health service at any level of the health care system,
- Selection of pharmaceuticals should be done by using sound criteria and by following rational approaches and guidelines
- Source of information matters in evidence-based pharmaceutical selection